

NISTTech

IRIS Digester-Evaporator Interface

For separation and quantification of metal-containing biomolecules

Description

The IRIS Digester-Evaporator Interface is a device that facilitates measuring metal-containing biomolecules such as selenium-containing proteins. It allows for the coupling of a reverse phase, high-performance liquid chromatography (RP-HPLC) to an inductively-coupled plasma mass spectrometer (ICP-MS), thereby enabling more accurate and reliable micronutrient measurements. The device partially digests the sample using nitric acid and then evaporates the undesirable high concentration of excess nitric acid and organic solvent in-line. It ultimately produces a continuous flow of the sample dissolved in water and readily usable by existing ICP-MS instruments.

NOTE: A Patent Cooperation Treaty was filed on Sept. 21, 2006, Application #PCT/IB2006/002624.

Applications

- **For the separation and quantification of metal containing biomolecules such as selenium containing proteins.**
- **HPLC-ICP-MS applications**
- **Fast on line sample preparations for ICP devices**
- **Flame atomic absorption spectrophotometer**

Advantages

- **Eliminates organic solvents on-line**
- **Permits optimized flow and temperature conditions**
- **The IRIS Digester- Evaporator can be cleaned on-line**
- **Overcomes the problem of high background signal**
- **The dimensions can be modified to suit different flow rates, and the system can partially digest the analyte before the solvent evaporation process**
Improves analyte transport to the ICP, permitting efficient analyte excitation and ionization, and reduces the carbon that tends to build up on the ICP-MS cones after extended use

Abstract

A digester-evaporator interface for partially digesting a sample mixed in a solvent with an acid and for evaporating the solvent and the acid after partial digestion, said digester-evaporator including a digester portion and an evaporator portion. The digester includes at least one reaction coil having an input and an output, said at least one reaction coil adapted for receiving at its input a flow of a sample in a solvent and an acid suitable for partial digestion of the sample so as to partially mix and begin partial digestion in the reaction coil; a heating element arranged along a portion of the reaction coil; at least a portion of the reaction coil proximate to its output being preheated by the heating element to a degree sufficient to convert a partially digested sample into vapor; a collector spoon with carrier water for collecting sample vapor; and an evaporator portion including an evaporation chamber including a cover with a first opening having the substantially vertically-oriented tube extending from the cover, and the evaporation chamber includes an axial opening longitudinally arranged therein, and the evaporation chamber adapted to contain fluid at a bottom portion. The collector spoon is arranged in the top of the substantially vertically-oriented tube after a vapor sample has been collected from the digester portion, and a gas supply tube for supplying a preheated gas provided in a top of the substantially vertically-oriented tube and in the axial opening of the evaporation chamber so as to create a cyclonic gas flow into the chamber and carry the sample to a container area in a bottom portion of the chamber. The interface is especially useful in the separation and quantification of selenium containing proteins.

Inventors

- Arce-Osuna, Mariana
- Bunk, David M.
- Long, Stephen E.

Citations

1. Arce-Osuna, Analytical Method Development for Selenium-containing Proteins of Clinical Interest, ProQuest Dissertations & Theses

References

- U.S. Patent #8,007,742 issued 08-30-2011, expires 05/29/2030
- Docket: 05-013US

Status of Availability

This invention is available for licensing exclusively or non-exclusively in any field of use.

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